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MATHEMATICS · JEE MAIN

Mathematical Reasoning

Previous Year Questions with answers

132 questions · **130** papers · **2008–2023** · newest paper first

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What is in this PDF: every Mathematical Reasoning question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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Chapter at a glance

2.2%
of Mathematics questions, 2019–2026

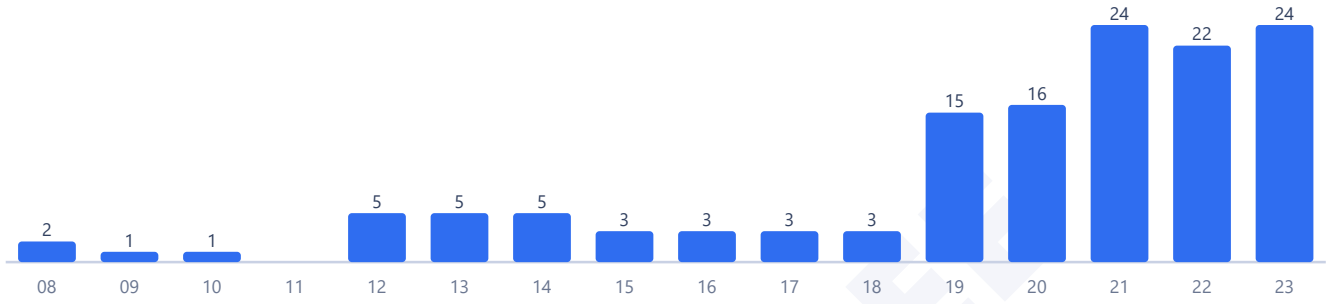
132
questions, 2008–2023

100 of 162
papers asked it, 2019–2026

130 / 2
MCQ / numerical, 2008–2023

Trend. Steady: 1 questions per paper in 2021–2023 against 1 in 2019–2020.

Questions per year



Counts are the questions we hold: 132 in 130 papers. 2 questions in this chapter came back in more than one paper.

Most-asked topics in this chapter (2008–2023)

Statements & Logic — 132

How often it comes up

Mathematical reasoning was formerly in the Class 11 mathematics curriculum before being removed in 2024, occupying rank 21 among the 29 chapters in the subject. Across the 162 papers conducted between 2019 and 2026, the examination included 101 questions from this chapter, capturing 2.2 percent of all mathematics questions. It appeared in 100 of those 162 papers, but was not asked in 2024, 2025, or 2026. Over the recent 2024 to 2026 testing cycles, zero questions were asked across 58 papers, averaging 0.0 questions per paper with a 0.0 percent subject share. Comparing the earlier 2002 to 2018 share of 2.4 percent with 2024 to 2026 shows that its long-term share is down, and comparing 2019 to 2026 against 2024 to 2026 also shows it is down. Across the complete historical record from 2008 to 2023 covering 200 papers, 132 questions appeared in 130 papers, including 2 numerical answer questions between 2019 and 2026.

Up until the end of the 2023 examination season, mathematical reasoning appeared in most testing sessions, delivering multiple-choice questions on symbolic logic. In 2024, 2025, and 2026, exactly zero questions appeared across all 58 examination sessions. As a result, candidates preparing for current and future examination cycles should omit this chapter from their preparation schedules.

Most-asked topics

Every historical problem in this chapter belongs to a single conceptual heading:

1. **Statements & Logic (101 questions, 2019-2026; 132 total, last asked 2023)** Encompassed truth tables, tautologies, contradictions (fallacies), logical connectives including conjunction, disjunction, implication, and biconditional, contrapositives, and negations of compound propositions using De Morgan's laws.

What the questions look like

Archived questions from 2019 to 2023 followed repetitive, standardized structures:

- **Tautology Verification**: Candidates were given four compound propositional statements involving implications and negations, and asked to identify which one evaluates to true under every possible truth assignment.

- **Negation and Contrapositive**: Finding the formal negation or the contrapositive of a conditional proposition expressed either in symbolic logic or in conversational English.
- **Equivalent Logical Form**: Simplifying a multi-bracketed logical expression using truth table values or boolean algebraic identities to identify an equivalent simpler proposition.
- **Operator Determination**: Choosing between logical AND or OR connectives for placeholder symbols so that a compound formula becomes a tautology.

How to practise it

Because this unit is no longer part of the examination, candidates should allocate zero study time to it:

- **Do not memorize truth tables for current exams**: The chapter has been completely eliminated from the syllabus and will not appear.
- **Redirect study hours to high-weight algebra**: Reallocate time previously spent on logic to matrix algebra, vectors, and coordinate lines.

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Q1 JEE Main 2023 · 15 Apr · Shift 1 MCQ

Negation of $p \wedge (q \wedge \sim (p \wedge q))$ is

(A) $(\sim (p \wedge q)) \vee p$
(B) $p \vee q$
(C) $\sim (p \vee q)$
(D) $(\sim (p \wedge q)) \wedge q$

Answer: (A) $(\sim (p \wedge q)) \vee p$ · Key from source paper

Q2 JEE Main 2023 · 13 Apr · Shift 1 MCQ

The negation of the statement $((A \wedge (B \vee C)) \Rightarrow (A \vee B)) \Rightarrow A$ is

(A) equivalent to $\sim C$
(B) equivalent to $B \vee \sim C$
(C) a fallacy
(D) equivalent to $\sim A$

Answer: (D) equivalent to $\sim A$ · Key from source paper

Q3 JEE Main 2023 · 13 Apr · Shift 2 MCQ

The statement $(p \wedge (\sim q)) \vee ((\sim p) \wedge q) \vee ((\sim p) \wedge (\sim q))$ is equivalent to ___

(A) $\sim p \vee q$
(B) $\sim p \vee \sim q$
(C) $p \vee \sim q$
(D) $p \vee q$

Answer: (B) $\sim p \vee \sim q$ · Key from source paper

Q4 JEE Main 2023 · 12 Apr · Shift 1 MCQ

Among the two statements
$(S_1) : (p \Rightarrow q) \wedge (p \wedge (\sim q))$ is a contradiction and $(S_2) : (p \wedge q) \vee ((\sim p) \wedge q) \vee (p \wedge (\sim q)) \vee ((\sim p) \wedge (\sim q))$ is a tautology

(A) only (S_2) is true
(B) only (S_1) is true
(C) both are false
(D) both are true

Answer: (D) both are true · Key from source paper

Q5 JEE Main 2023 · 11 Apr · Shift 1 · Numerical

The number of ordered triplets of the truth values of p, q and r such that the truth value of the statement $p \vee q \wedge p \vee r \Rightarrow q \vee r$ is True, is equal to

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q6 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

The converse of $((\sim p) \wedge q) \Rightarrow r$ is

(A) $((\sim p) \vee q) \Rightarrow r$

(B) $(\sim r) \Rightarrow p \wedge q$

(C) $(\sim r) \Rightarrow ((\sim p) \wedge q)$

(D) $(p \vee (\sim q)) \Rightarrow (\sim r)$

Answer: (D) $(p \vee (\sim q)) \Rightarrow (\sim r)$ · Key from source paper

Q7 JEE Main 2023 · 10 Apr · Shift 1 · MCQ

The negation of the statement $p \vee q \wedge q \vee \sim r$ is

(A) $p \vee r \wedge \sim q$

(B) $\sim p) \vee r \wedge \sim q$

(C) $\sim p \vee \sim q \vee \sim r$

(D) $\sim p \vee \sim q \wedge \sim r$

Answer: (B) $\sim p) \vee r \wedge \sim q$ · Key from source paper

Q8 JEE Main 2023 · 10 Apr · Shift 2 · MCQ

The statement $\sim p \vee \sim p \wedge q$ is equivalent to

(A) $\sim p \wedge q$

(B) $p \wedge q \wedge \sim p$

(C) $\sim p \wedge q \wedge q$

(D) $\sim p \vee q$

Answer: (B) $p \wedge q \wedge \sim p$ · Key from source paper

Q9 JEE Main 2023 · 8 Apr · Shift 1 · MCQ

Negation of $(p \to q) \to (q \to p)$ is

(A) $(p \sim) \vee p$
(B) $q \wedge (\sim p)$
(C) $(\sim q) \wedge p$
(D) $p \vee (\sim q)$

Answer: (B) $q \wedge (\sim p)$ · Key from source paper

Q10 JEE Main 2023 · 8 Apr · Shift 2 MCQ

The negation of $(p \wedge (-q)) \vee (-p)$ is equivalent to

(A) $p \wedge (-q)$
(B) $p \wedge q$
(C) $p \vee (q \vee (-p))$
(D) $p \wedge (q \wedge (-p))$

Answer: (B) $p \wedge q$ · Key from source paper

Q11 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Statement $(P \Rightarrow Q) \wedge (R \Rightarrow Q)$ is logically equivalent to

(A) $P \Rightarrow R \vee Q \Rightarrow R$
(B) $P \wedge R \Rightarrow Q$
(C) $P \Rightarrow R \wedge Q \Rightarrow R$
(D) $P \vee R \Rightarrow Q$

Answer: (D) $P \vee R \Rightarrow Q$ · Key from source paper

Q12 JEE Main 2023 · 6 Apr · Shift 2 MCQ

Among the statements

$(S1) : (p \Rightarrow q) \vee ((\sim p) \wedge q)$ is a tautology

$(S2) : (q \Rightarrow p) \Rightarrow ((\sim p) \wedge q)$ is a contradiction

(A) Neither $(S1)$ nor $(S2)$ is True
(B) Both $(S1)$ and $(S2)$ are True
(C) Only $(S2)$ is True
(D) Only $(S1)$ is True

Answer: (A) Neither $(S1)$ nor $(S2)$ is True · Key from source paper

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Q13 JEE Main 2023 · 1 Feb · Shift 1 MCQ

The negation of the expression $q \vee ((\sim q) \wedge p)$ is equivalent to

(A) $(\sim p) \wedge (\sim q)$
(B) $p \wedge (\sim q)$
(C) $(\sim p) \vee (\sim q)$
(D) $(\sim p) \vee q$

Answer: (A) $(\sim p) \wedge (\sim q)$ · Key from source paper

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Q14 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Which of the following statements is a tautology?

(A) $p \rightarrow (p \wedge (p \rightarrow q))$
(B) $(p \wedge q) \rightarrow (\sim (p) \rightarrow q)$
(C) $(p \wedge (p \rightarrow q)) \rightarrow \sim q$
(D) $p \vee (p \wedge q)$

Answer: (B) $(p \wedge q) \rightarrow (\sim (p) \rightarrow q)$ · Key from source paper

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Q15 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Consider:
S1: $p \Rightarrow q \vee p \wedge \sim q$ is a tautology.
S2: $\sim p \Rightarrow \sim q \wedge \sim p \vee q$ is a contradiction.
Then

(A) only S2 is correct
(B) both S1 and S2 are correct
(C) both S1 and S2 are wrong
(D) only S1 is correct

Answer: (D) only S1 is correct · Key from source paper

Q16 JEE Main 2023 · 31 Jan · Shift 2 MCQ

The number of values of $r \in \{p, q, \sim p, \sim q\}$ for which $((p \wedge q) \Rightarrow (r \vee q)) \wedge ((p \wedge r) \Rightarrow q)$ is a tautology, is :

(A) 1
(B) 2
(C) 4
(D) 3

Answer: (B) 2 · Key from source paper

Q17 JEE Main 2023 · 30 Jan · Shift 1 MCQ

Among the statements:
$S1: p \vee q \Rightarrow r \Leftrightarrow p \Rightarrow r$

$S2: p \vee q \Rightarrow r \Leftrightarrow p \Rightarrow r \vee q \Rightarrow r$

(A) Only $(S1)$ is a tautology
(B) Neither $(S1)$ nor $(S2)$ is a tautology
(C) Only $(S2)$ is a tautology
(D) Both $(S1)$ and $(S2)$ are tautologies

Answer: (B) Neither $(S1)$ nor $(S2)$ is a tautology · Key from source paper

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Q18 JEE Main 2023 · 30 Jan · Shift 2 MCQ

Consider the following statements:
P : I have fever
Q : I will not take medicine
R : I will take rest
The statement "If I have fever, then I will take medicine and I will take rest" is equivalent to:

(A) $((\sim P) \vee \sim Q) \wedge ((\sim P) \vee R)$
(B) $((\sim P) \vee -Q) \wedge ((\sim P) \vee \sim R)$
(C) $(P \vee Q) \wedge ((\sim \mathrm{P}) \vee \mathrm{R})$
(D) $(P \vee \sim Q) \wedge (P \vee \sim R)$

Answer: (A) $((\sim P) \vee \sim Q) \wedge ((\sim P) \vee R)$ · Key from source paper

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Q19 JEE Main 2023 · 29 Jan · Shift 1 MCQ

If p, q and r are three propositions, then which of the following combination of truth values of p, q and r makes the logical expression $\{(p \vee q) \wedge ((\sim p) \vee r)\} \rightarrow ((\sim q) \vee r)$ false ?

(A) $p = \mathrm{T}, q = \mathrm{F}, r = \mathrm{T}$
(B) $p = \mathrm{T}, q = \mathrm{T}, r = \mathrm{F}$
(C) $p = \mathrm{F}, q = \mathrm{T}, r = \mathrm{F}$
(D) $p = \mathrm{T}, q = \mathrm{F}, r = \mathrm{F}$

Answer: (C) $p = \mathrm{F}, q = \mathrm{T}, r = \mathrm{F}$ · Key from source paper

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Q20 JEE Main 2023 · 29 Jan · Shift 2 MCQ

The statement $B \Rightarrow ((\sim A) \vee B)$ is not equivalent to :

(A) $B \Rightarrow (A \Rightarrow B)$
(B) $A \Rightarrow (A \Leftrightarrow B)$
(C) $A \Rightarrow ((\sim A) \Rightarrow B)$
(D) $B \Rightarrow ((\sim A) \Rightarrow B)$

Answer: (B) $A \Rightarrow (A \Leftrightarrow B)$ · Key from source paper

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Q21 JEE Main 2023 · 25 Jan · Shift 1 MCQ

The statement $(p \wedge (\sim q)) \Rightarrow (p \Rightarrow (\sim q))$ is

(A) equivalent to $(\sim p) \vee (\sim q)$
(B) a tautology
(C) equivalent to $p \vee q$
(D) a contradiction

Answer: (B) a tautology · Key from source paper

Q22 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Let $\triangle, \nabla \in \{\wedge, \vee\}$ be such that $(\mathrm{p} \rightarrow \mathrm{q}) \triangle (\mathrm{p} \nabla \mathrm{q})$ is a tautology. Then

(A) $\triangle = \wedge,\ \nabla = \vee$
(B) $\triangle = \vee,\ \nabla = \wedge$
(C) $\triangle = \vee,\ \nabla = \vee$
(D) $\triangle = \wedge,\ \nabla = \wedge$

Answer: (C) $\triangle = \vee,\ \nabla = \vee$ · Key from source paper

Q23 JEE Main 2023 · 24 Jan · Shift 1 MCQ

The compound statement $(\sim (P \wedge Q)) \vee ((\sim P) \wedge Q) \Rightarrow ((\sim P) \wedge (\sim Q))$ is equivalent to

(A) $((\sim P) \vee Q) \wedge ((\sim Q) \vee P)$
(B) $(\sim Q) \vee P$
(C) $((\sim P) \vee Q) \wedge (\sim Q)$
(D) $(\sim P) \vee Q$

Answer: (A) $((\sim P) \vee Q) \wedge ((\sim Q) \vee P)$ · Key from source paper

Q24 JEE Main 2023 · 24 Jan · Shift 2 MCQ

Let p and q be two statements. Then $\sim (p \wedge (p \rightarrow \sim q))$ is equivalent to

(A) $p \vee (p \wedge (\sim q))$
(B) $p \vee ((\sim p) \wedge q)$
(C) $(\sim p) \vee q$
(D) $p \vee (p \wedge q)$

Answer: (C) $(\sim p) \vee q$ · Key from source paper

Q25 JEE Main 2022 · 29 Jul · Shift 1 MCQ

The statement $(p \wedge q) \Rightarrow (p \wedge r)$ is equivalent to

(A) $q \Rightarrow (p \wedge r)$
(B) $p \Rightarrow (p \wedge r)$
(C) $(p \wedge r) \Rightarrow (p \wedge q)$
(D) $(p \wedge q) \Rightarrow r$

Answer: (D) $(p \wedge q) \Rightarrow r$ · Key from source paper

Q26 JEE Main 2022 · 29 Jul · Shift 2 MCQ

The statement $p \Rightarrow q \vee p \Rightarrow r$ is NOT equivalent to:

(A) $p \wedge \sim r \Rightarrow q$
(B) $\sim q \Rightarrow \sim r \vee p$
(C) $p \Rightarrow q \vee r$
(D) $p \wedge \sim q \Rightarrow r$

Answer: (B) $\sim q \Rightarrow \sim r \vee p$ · Key from source paper

Q27 JEE Main 2022 · 28 Jul · Shift 1 MCQ

Let the operations $*, \odot \in \wedge, \vee$. If $p * q \odot p \odot \sim q$ is a tautology, then the ordered pair $*, \odot$ is

(A) $\vee, \wedge$
(B) $\vee, \vee$
(C) $\wedge, \wedge$
(D) $\wedge, \vee$

Answer: (B) $\vee, \vee$ · Key from source paper

Q28 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Let
p : Ramesh listens to music.
q : Ramesh is out of his village
r : It is Sunday
s : It is Saturday
Then the statement "Ramesh listens to music only if he is in his village and it is Sunday or Saturday" can be expressed as

(A) $((\sim q) \wedge (r \vee s)) \Rightarrow p$
(B) $(q \wedge (r \vee s)) \Rightarrow p$
(C) $p \Rightarrow (q \wedge (r \vee s))$
(D) $p \Rightarrow ((\sim q) \wedge (r \vee s))$

Answer: (D) $p \Rightarrow ((\sim q) \wedge (r \vee s))$ · Key from source paper

Q29 JEE Main 2022 · 27 Jul · Shift 1 MCQ

$(p \wedge r) \Leftrightarrow (p \wedge (\sim q))$ is equivalent to $(\sim p)$ when r is

(A) p
(B) $\sim p$
(C) q
(D) $\sim q$

Answer: (C) q · Key from source paper

Q30 JEE Main 2022 · 27 Jul · Shift 2 MCQ

If the truth value of the statement $(P \wedge (\sim R)) \rightarrow ((\sim R) \wedge Q)$ is F, then the truth value of which of the following is F?

(A) $P \vee Q \rightarrow \sim R$
(B) $R \vee Q \rightarrow \sim P$
(C) $\sim (P \vee Q) \rightarrow \sim R$
(D) $\sim (R \vee Q) \rightarrow \sim P$

Answer: (D) $\sim (R \vee Q) \rightarrow \sim P$ · Key from source paper

Q31 JEE Main 2022 · 26 Jul · Shift 1 MCQ

The statement $(\sim (p \Leftrightarrow \sim q)) \wedge q$ is:

(A) a tautology
(B) a contradiction
(C) equivalent to $(p \Rightarrow q) \wedge q$
(D) equivalent to $(p \Rightarrow q) \wedge p$

Answer: (D) equivalent to $(p \Rightarrow q) \wedge p$ · Key from source paper

Q32 JEE Main 2022 · 26 Jul · Shift 2 MCQ

Negation of the Boolean expression $p \leftrightarrow q \rightarrow p$ is

(A) $\sim p \wedge q$
(B) $p \wedge \sim q$
(C) $\sim p \vee \sim q$
(D) $\sim p \wedge \sim q$

Answer: (D) $\sim p \wedge \sim q$ · Key from source paper

Q33 JEE Main 2022 · 25 Jul · Shift 1 MCQ

Which of the following statements is a tautology?

(A) $\sim p \vee q \Rightarrow p$
(B) $p \Rightarrow \sim p \vee q$
(C) $\sim p \vee q \Rightarrow q$
(D) $q \Rightarrow \sim p \vee q$

Answer: (D) $q \Rightarrow \sim p \vee q$ · Key from source paper

Q34 JEE Main 2022 · 25 Jul · Shift 2 MCQ

Consider the following statements:
P : Ramu is intelligent.
Q : Ramu is rich.
R : Ramu is not honest.
The negation of the statement "Ramu is intelligent and honest if and only if Ramu is not rich" can be expressed as:

(A) $((P \wedge (\sim R)) \wedge Q) \wedge ((\sim Q) \wedge ((\sim P) \vee R))$
(B) $((P \wedge R) \wedge Q) \vee ((\sim Q) \wedge ((\sim P) \vee (\sim R)))$
(C) $((P \wedge R) \wedge Q) \wedge ((\sim Q) \wedge ((\sim P) \vee (\sim R)))$
(D) $((P \wedge (\sim R)) \wedge Q) \vee ((\sim Q) \wedge ((\sim P) \wedge R))$

Answer: (D) $((P \wedge (\sim R)) \wedge Q) \vee ((\sim Q) \wedge ((\sim P) \wedge R))$ · Key from source paper

Q35 JEE Main 2022 · 29 Jun · Shift 1 MCQ

Let $\Delta \in \{\wedge, \vee, \Rightarrow, \Leftrightarrow\}$ be such that $(p \wedge q) \, \Delta \, ((p \vee q) \Rightarrow q)$ is a tautology. Then Δ is equal to

(A) $\wedge$
(B) $\vee$
(C) $\Rightarrow$
(D) $\Leftrightarrow$

Answer: (C) $\Rightarrow$ · Key from source paper

Q36 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Negation of the Boolean statement $(p \vee q) \Rightarrow ((\sim r) \vee p)$ is equivalent to:

(A) $p \wedge (\sim q) \wedge r$
(B) $(\sim p) \wedge (\sim q) \wedge r$
(C) $(\sim p) \wedge q \wedge r$
(D) $p \wedge q \wedge (\sim r)$

Answer: (C) $(\sim p) \wedge q \wedge r$ · Key from source paper

Q37 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Let p, q, r be three logical statements. Consider the compound statements
$S_1 : ((\sim p) \vee q) \vee ((\sim p) \vee r)$ and $S_2 : p \rightarrow (q \vee r)$
Then, which of the following is NOT true?

(A) If S_2 is True, then S_1 is True
(B) If S_2 is False, then S_1 is False
(C) IfS_2 is False, then S_1 is True
(D) If S_1 is False, then S_2 is False

Answer: (C) IfS_2 is False, then S_1 is True · Key from source paper

Q38 JEE Main 2022 · 28 Jun · Shift 2 Numerical

The maximum number of compound propositions, out of $p \vee r \vee s, p \vee r \vee \sim s, p \vee \sim q \vee s,$
$\sim p \vee \sim r \vee s, \sim p \vee \sim r \vee \sim s, \sim p \vee q \vee \sim s,$
$q \vee r \vee \sim s, q \vee \sim r \vee \sim s, \sim p \vee \sim q \vee \sim s$
that can be made simultaneously true by an assignment of the truth values to p, q, r and s, is equal to

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q39 JEE Main 2022 · 27 Jun · Shift 1 MCQ

The boolean expression $(\sim (p \wedge q)) \vee q$ is equivalent to

(A) $q \rightarrow (p \wedge q)$
(B) $p \rightarrow q$
(C) $p \rightarrow (p \rightarrow q)$
(D) $p \rightarrow (p \vee q)$

Answer: (D) $p \rightarrow (p \vee q)$ · Key from source paper

Q40 JEE Main 2022 · 27 Jun · Shift 2 MCQ

Which of the following statement is a tautology?

(A) $((\sim q) \wedge p) \wedge q$
(B) $((\sim q) \wedge p) \wedge (p \wedge (\sim p))$
(C) $((\sim q) \wedge p) \vee (p \vee (\sim p))$
(D) $(p \wedge q) \wedge (\sim (p \wedge q))$

Answer: (C) $((\sim q) \wedge p) \vee (p \vee (\sim p))$ · Key from source paper

Q41 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Let $\Delta, \nabla \in \{\wedge, \vee\}$ be such that $p \nabla q \rightarrow ((p \Delta q) \nabla r)$ is a tautology. Then $(p \nabla q) \Delta r$ is logically equivalent to

(A) $(p \Delta r) \vee q$
(B) $(p \Delta r) \wedge q$
(C) $(p \wedge r) \Delta q$
(D) $(p \nabla r) \wedge q$

Answer: (A) $(p \Delta r) \vee q$ · Key from source paper

Q42 JEE Main 2022 · 26 Jun · Shift 2 MCQ

Let $r \in (P, q, \sim p, \sim q)$ be such that the logical statement $r \vee (\sim p) \Rightarrow (p \wedge q) \vee r$ is a tautology. Then r is equal to

(A) p
(B) q
(C) $\sim p$
(D) $\sim q$

Answer: (C) $\sim p$ · Key from source paper

Q43 JEE Main 2022 · 25 Jun · Shift 1 MCQ

Consider the following two propositions :
P_1: $\sim (p \rightarrow \sim q)$
P_2: $(p \wedge \sim q) \wedge (\sim p \vee q)$
If the proposition $p \rightarrow (\sim p \vee q)$ is evaluated as FALSE, then

(A) P_1 is TRUE and P_2 is FALSE
(B) P_1 is FALSE and P_2 is TRUE
(C) Both P_1 and P_2 are FALSE
(D) Both P_1 and P_2 are TRUE

Answer: (C) Both P_1 and P_2 are FALSE · Key from source paper

Q44 JEE Main 2022 · 25 Jun · Shift 2 MCQ

The negation of the Boolean expression $\sim q \wedge p \Rightarrow \sim p \vee q$ is logically equivalent to

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(A) $p \Rightarrow q$
(B) $q \Rightarrow p$
(C) $\sim p \Rightarrow q$
(D) $\sim q \Rightarrow p$

Answer: (C) $\sim p \Rightarrow q$ · Key from source paper

Q45 JEE Main 2022 · 24 Jun · Shift 1 MCQ

The number of choices for $\Delta \in \{\wedge, \vee, \Rightarrow, \Leftrightarrow\}$, such that $(p \Delta q) \Rightarrow ((p \Delta \sim q) \vee ((\sim p) \Delta q))$ is a tautology, is

(A) 1
(B) 2
(C) 3
(D) 4

Answer: (B) 2 · Key from source paper

Q46 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Consider the following statements:
A: Rishi is a judge.
B: Rishi is honest.
C: Rishi is not arrogant.
The negation of the statement "if Rishi is a judge and he is not arrogant, then he is honest" is

(A) $B \rightarrow (A \vee C)$
(B) $(\sim B) \wedge (A \wedge C)$
(C) $B \rightarrow ((\sim A) \vee (\sim C))$
(D) $B \rightarrow (A \wedge C)$

Answer: (B) $(\sim B) \wedge (A \wedge C)$ · Key from source paper

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Q47 JEE Main 2021 · 1 Sep · Shift 2 MCQ

Which of the following is equivalent to the Boolean expression $\mathrm{p} \wedge \sim \mathrm{q}$?

(A) $\sim p \rightarrow \sim q$
(B) $\sim (q \rightarrow p)$
(C) $\sim (p \rightarrow q)$
(D) $\sim (p \rightarrow \sim q)$

Answer: (C) $\sim (p \rightarrow q)$ · Key from source paper

Q48 JEE Main 2021 · 31 Aug · Shift 1 MCQ

Let $*, \square \in \{\wedge, \vee\}$ be such that the Boolean expression $(p * \sim q) \Rightarrow (p \square q)$ is a tautology. Then :

(A) $* = \vee, \square = \wedge$
(B) $* = \vee, \square = \vee$
(C) $* = \wedge, \square = \vee$
(D) $* = \wedge, \square = \wedge$

Answer: (C) $* = \wedge, \square = \vee$ · Key from source paper

Q49 JEE Main 2021 · 31 Aug · Shift 2 MCQ

Negation of the statement $(p \vee r) \Rightarrow (q \vee r)$ is :

(A) $\sim p \wedge q \wedge \sim r$
(B) $\sim p \wedge q \wedge r$
(C) $p \wedge \sim q \wedge \sim r$
(D) $p \wedge q \wedge r$

Answer: (C) $p \wedge \sim q \wedge \sim r$ · Key from source paper

Q50 JEE Main 2021 · 27 Aug · Shift 1 MCQ

The statement $(p \wedge (p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow r$ is

(A) a tautology
(B) equivalent to $q \rightarrow \sim r$
(C) a fallacy
(D) equivalent to $p \rightarrow \sim r$

Answer: (A) a tautology · Key from source paper

Q51 JEE Main 2021 · 27 Aug · Shift 2 MCQ

The Boolean expression $(p \wedge q) \Rightarrow ((r \wedge q) \wedge p)$ is equivalent to:

(A) $(p \wedge r) \Rightarrow (p \wedge q)$
(B) $(q \wedge r) \Rightarrow (p \wedge q)$
(C) $(p \wedge q) \Rightarrow (r \wedge q)$
(D) $(p \wedge q) \Rightarrow (r \vee q)$

Answer: (C) $(p \wedge q) \Rightarrow (r \wedge q)$ · Key from source paper

Q52 JEE Main 2021 · 26 Aug · Shift 1 MCQ

If the truth value of the Boolean expression $((p \vee q) \wedge (q \rightarrow r) \wedge (\sim r)) \rightarrow (p \wedge q)$ is false, then the truth values of the statements $p,\ q,\ r$ respectively can be:

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(A) FTF
(B) TFF
(C) TFT
(D) FFT

Answer: (B) TFF · Key from source paper

Q53 JEE Main 2021 · 26 Aug · Shift 2 MCQ

Consider the two statements :
$(S_1) : (p \rightarrow q) \vee (\sim q \rightarrow p)$ is a tautology.
$(S_2) : (p \wedge \sim q) \wedge (\sim p \vee q)$ is a fallacy.
Then :

(A) only (S_1) is true.
(B) both (S_1) and (S_2) are false.
(C) only (S_2) is true.
(D) both (S_1) and (S_2) are true.

Answer: (D) both (S_1) and (S_2) are true. · Key from source paper

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Q54 JEE Main 2021 · 27 Jul · Shift 1 MCQ

The compound statement $(P \vee Q) \wedge (\sim P) \Rightarrow Q$ equivalent to:

(A) $P \vee Q$
(B) $P \wedge \sim Q$
(C) $\sim (P \Rightarrow Q)$
(D) $\sim (P \Rightarrow Q) \Leftrightarrow P \wedge \sim Q$

Answer: (D) $\sim (P \Rightarrow Q) \Leftrightarrow P \wedge \sim Q$ · Key from source paper

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Q55 JEE Main 2021 · 27 Jul · Shift 2 MCQ

Which of the following is the negation of the statement "for all $M > 0$, there exists $x \in S$ such that $x \geq M$"?

(A) there exists $M > 0$, such that $x < M$ for all $x \in S$
(B) there exists $M > 0$, there exists $x \in S$ such that $x \geq M$
(C) there exists $M > 0$, there exists $x \in S$ such that $x < M$
(D) there exists $M > 0$ such that $x \geq M$ for all $x \in S$

Answer: (A) there exists $M > 0$, such that $x < M$ for all $x \in S$ · Key from source paper

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Q56 JEE Main 2021 · 25 Jul · Shift 1 MCQ

The Boolean expression $(p \Rightarrow q) \wedge (q \Rightarrow \sim p)$ is equivalent to :

(A) $\sim q$
(B) q
(C) p
(D) $\sim p$

Answer: (D) $\sim p$ · Key from source paper

Q57 JEE Main 2021 · 25 Jul · Shift 2 MCQ

Consider the statement "The match will be played only if the weather is good and ground is not wet". Select the correct negation from the following:

(A) The match will not be played and weather is not good and ground is wet.
(B) If the match will not be played, then either weather is not good or ground is wet.
(C) The match will be played and weather is not good or ground is wet.
(D) The match will not be played or weather is good and ground is not wet.

Answer: (C) The match will be played and weather is not good or ground is wet. · Key from source paper

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Q58 JEE Main 2021 · 22 Jul · Shift 1 MCQ

Which of the following Boolean expressions is not a tautology?

(A) $(p \Rightarrow q) \vee (\sim q \Rightarrow p)$
(B) $(q \Rightarrow p) \vee (\sim q \Rightarrow p)$
(C) $(p \Rightarrow \sim q) \vee (\sim q \Rightarrow p)$
(D) $(\sim p \Rightarrow q) \vee (\sim q \Rightarrow p)$

Answer: (D) $(\sim p \Rightarrow q) \vee (\sim q \Rightarrow p)$ · Key from source paper

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Q59 JEE Main 2021 · 20 Jul · Shift 1 MCQ

The Boolean expression $(p \wedge \sim q) \Rightarrow (q \vee \sim p)$ is equivalent to:

(A) $q \Rightarrow p$
(B) $p \Rightarrow q$
(C) $\sim q \Rightarrow p$
(D) $p \Rightarrow \sim q$

Answer: (B) $p \Rightarrow q$ · Key from source paper

Q60 JEE Main 2021 · 20 Jul · Shift 2 MCQ

Consider the following three statements:
(A) If $3 + 3 = 7$ then $4 + 3 = 8$
(B) If $5 + 3 = 8$ then earth is flat.
(C) If both (A) and (B) are true then $5 + 6 = 17$.
Then, which of the following statements is correct?

(A) (A) is false, but (B) and (C) are true
(B) (A) and (C) are true while (B) is false
(C) (A) is true while (B) and (C) are false
(D) (A) and (B) are false while (C) is true

Answer: (B) (A) and (C) are true while (B) is false · Key from source paper

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Q61 JEE Main 2021 · 18 Mar · Shift 2 MCQ

If P and Q are two statements, then which of the following compound statement is a tautology?

(A) $((P \Rightarrow Q) \wedge \sim Q) \Rightarrow Q$
(B) $((P \Rightarrow Q) \wedge \sim Q) \Rightarrow \sim P$
(C) $((P \Rightarrow Q) \wedge \sim Q) \Rightarrow P$
(D) $((P \Rightarrow Q) \wedge \sim Q) \Rightarrow (P \wedge Q)$

Answer: (B) $((P \Rightarrow Q) \wedge \sim Q) \Rightarrow \sim P$ · Key from source paper

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Q62 JEE Main 2021 · 17 Mar · Shift 1 MCQ

If the Boolean expression $(p \Rightarrow q) \Leftrightarrow (q^*(\sim p))$ is a tautology, then the Boolean expression $p^*(\sim q)$ is equivalent to:

(A) $q \Rightarrow p$
(B) $\sim q \Rightarrow p$
(C) $p \Rightarrow \sim q$
(D) $p \Rightarrow q$

Answer: (A) $q \Rightarrow p$ · Key from source paper

Q63 JEE Main 2021 · 17 Mar · Shift 2 MCQ

If the Boolean expression $(\mathrm{p} \wedge \mathrm{q}) \circledast (\mathrm{p} \otimes \mathrm{q})$ is a tautology, then $\circledast$ and $\otimes$ are respectively given by

(A) $\rightarrow, \rightarrow$
(B) $\wedge, \vee$
(C) $\vee, \rightarrow$
(D) $\wedge, \rightarrow$

Answer: (A) $\rightarrow, \rightarrow$ · Key from source paper

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Q64 JEE Main 2021 · 16 Mar · Shift 1 MCQ

Which of the following Boolean expression is a tautology ?

(A) $(p \wedge q) \vee (p \vee q)$
(B) $(p \wedge q) \vee (p \rightarrow q)$
(C) $(p \wedge q) \wedge (p \rightarrow q)$
(D) $(p \wedge q) \rightarrow (p \rightarrow q)$

Answer: (D) $(p \wedge q) \rightarrow (p \rightarrow q)$ · Key from source paper

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Q65 JEE Main 2021 · 26 Feb · Shift 2 MCQ

Let $F_1(A, B, C) = (A \wedge \sim B) \vee [\sim C \wedge (A \vee B)] \vee \sim A$ and $F_2(A, B) = (A \vee B) \vee (B \rightarrow \sim A)$ be two logical expressions. Then :

(A) F_1 is a tautology but F_2 is not a tautology
(B) F_1 is not a tautology but F_2 is a tautology
(C) Both F_1 and F_2 are not tautologies
(D) F_1 and F_2 both are tautologies

Answer: (B) F_1 **is not a tautology but** F_2 **is a tautology** · Key from source paper

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Q66 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The statement $A \rightarrow (B \rightarrow A)$ is equivalent to :

(A) $A \rightarrow (A \wedge B)$
(B) $A \rightarrow (A \vee B)$
(C) $A \rightarrow (A \leftrightarrow B)$
(D) $A \rightarrow (A \rightarrow B)$

Answer: (B) $A \rightarrow (A \vee B)$ · Key from source paper

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Q67 JEE Main 2021 · 25 Feb · Shift 2 MCQ

The contrapositive of the statement "If you will work, you will earn money" is:

(A) If you will not earn money, you will not work
(B) To earn money, you need to work
(C) You will earn money, if you will not work
(D) If you will earn money, you will work

Answer: (A) If you will not earn money, you will not work · Key from source paper

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Q68 JEE Main 2021 · 24 Feb · Shift 1 MCQ

The statement among the following that is a tautology is:

(A) $A \vee A \wedge B$
(B) $A \wedge A \vee B$
(C) $B \rightarrow A \wedge A \rightarrow B$
(D) $A \wedge A \rightarrow B \rightarrow B$

Answer: (D) $A \wedge A \rightarrow B \rightarrow B$ · Key from source paper

Q69 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The negation of the statement $\sim p \wedge (p \vee q)$ is:

(A) $\sim p \vee q$
(B) $\sim p \wedge q$
(C) $p \vee \sim q$
(D) $p \wedge \sim q$

Answer: (C) $p \vee \sim q$ · Key from source paper

Q70 JEE Main 2021 · 24 Feb · Shift 2 MCQ

For the statements p and q, consider the following compound statements:
(a) $(\sim q \wedge (p \rightarrow q)) \rightarrow \sim p$
(b) $((p \vee q) \wedge \sim p) \rightarrow q$
Then which of the following statements is correct?

(A) (b) is a tautology but not (a).
(B) (a) and (b) both are tautologies.
(C) (a) and (b) both are not tautologies.
(D) (a) is a tautology but not (b).

Answer: (B) (a) **and** (b) **both are tautologies.** · Key from source paper

Q71 JEE Main 2020 · 6 Sep · Shift 1 MCQ

The negation of the Boolean expression $p \vee (\sim p \wedge q)$ is equivalent to :

(A) $p \wedge \sim q$
(B) $\sim p \wedge \sim q$
(C) $\sim p \vee \sim \mathrm{q}$
(D) $\sim p \vee q$

Answer: (B) $\sim p \wedge \sim q$ · Key from source paper

Q72 JEE Main 2020 · 6 Sep · Shift 2 MCQ

Consider the statement: "For an integer n, if $n^3 - 1$ is even, then n is odd". The contrapositive statement of this statement is:

(A) For an integer n, if n is even, then $n^3 - 1$ is odd.
(B) For an integer n, if $n^3 - 1$ is not even, then n is not odd.
(C) For an integer n, if n is even, then $n^3 - 1$ is even.
(D) For an integer n, if n is odd, then $n^3 - 1$ is even.

Answer: (A) For an integer n, if n is even, then $n^3 - 1$ is odd. · Key from source paper

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Q73 JEE Main 2020 · 5 Sep · Shift 1 MCQ

The negation of the Boolean expression $x \leftrightarrow \sim y$ is equivalent to:

(A) $(\sim x \wedge y) \vee (\sim x \wedge \sim y)$
(B) $(x \wedge y) \vee (\sim x \wedge \sim y)$
(C) $(x \wedge \sim y) \vee (\sim x \wedge y)$
(D) $(x \wedge y) \wedge (\sim x \vee \sim y)$

Answer: (B) $(x \wedge y) \vee (\sim x \wedge \sim y)$ · Key from source paper

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Q74 JEE Main 2020 · 5 Sep · Shift 2 MCQ

The statement $(p \rightarrow (q \rightarrow p)) \rightarrow (p \rightarrow (p \vee q))$ is :

(A) equivalent to $(p \wedge q) \vee (\sim q)$
(B) a contradiction
(C) equivalent to $(p \vee q) \wedge (\sim p)$
(D) a tautology

Answer: (D) a tautology · Key from source paper

Q75 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Given the following two statements:
$(S_1) : (q \vee p) \rightarrow (p \leftrightarrow \sim q)$ is a tautology
$(S_2) : \sim q \wedge (\sim p \leftrightarrow q)$ is a fallacy. Then :

(A) both (S_1) and (S_2) are not correct.
(B) only (S_1) is correct.
(C) only (S_2) is correct.
(D) both (S_1) and (S_2) are correct.

Answer: (A) both (S_1) and (S_2) are not correct. · Key from source paper

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Q76 JEE Main 2020 · 4 Sep · Shift 2 MCQ

Contrapositive of the statement :
'If a function f is differentiable at a, then it is also continuous at a', is

(A) If a function f is continuous at a, then it is not differentiable at a.
(B) If a function f is not continuous at a, then it is not differentiable at a.
(C) If a function f is not continuous at a. then it is differentiable at a.
(D) If a function f is continuous at a, then it is differentiable at a.

Answer: (B) If a function f is not continuous at a, then it is not differentiable at a. · Key from source paper

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Q77 JEE Main 2020 · 3 Sep · Shift 1 MCQ

The proposition $p \rightarrow \sim (p \wedge \sim q)$ is equivalent to :

(A) q
(B) $(\sim p) \vee q$
(C) $(\sim p) \wedge q$
(D) $(\sim p) \vee (\sim q)$

Answer: (B) $(\sim p) \vee q$ · Key from source paper

Q78 JEE Main 2020 · 3 Sep · Shift 2 MCQ

Let p, q, r be three statements such that the truth value of $(p \wedge q) \rightarrow (\sim q \vee r)$ is F . Then the truth values of p, q, r are respectively :

(A) $T,\ T,\ F$
(B) $T,\ T,\ T$
(C) $T,\ F,\ T$
(D) $F,\ T,\ F$

Answer: (A) $T,\ T,\ F$ · Key from source paper

Q79 JEE Main 2020 · 2 Sep · Shift 1 MCQ

The contrapositive of the statement "If I reach the station in time, then I will catch the train" is

(A) If I do not reach the station in time, then I will catch the train.
(B) If do not reach the station in time, then I will not catch the train.
(C) If I will catch the train, then I reach the station in time.
(D) If I will not catch the train, then I do not reach the station in time.

Answer: (D) If I will not catch the train, then I do not reach the station in time. · Key from source paper

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Q80 JEE Main 2020 · 2 Sep · Shift 2 MCQ

Which of the following is a tautology?

(A) $(\sim p) \wedge (p \vee q) \rightarrow q$
(B) $(q \rightarrow p) \vee \sim (p \rightarrow q)$
(C) $(\sim q) \vee (p \wedge q) \rightarrow q$
(D) $(p \rightarrow q) \wedge (q \rightarrow p)$

Answer: (A) $(\sim p) \wedge (p \vee q) \rightarrow q$ · Key from source paper

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Q81 JEE Main 2020 · 9 Jan · Shift 1 MCQ

Negation of the statement: $\sqrt{5}$ is an integer or 5 is irrational is:

(A) $\sqrt{5}$ is not an integer 5 is not irrational
(B) $\sqrt{5}$ is not an integer and 5 is not irrational
(C) $\sqrt{5}$ is irrational or 5 is an integer
(D) $\sqrt{5}$ is an integer and 5 irrational

Answer: (B) $\sqrt{5}$ **is not an integer and 5 is not irrational** · Key from source paper

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Q82 JEE Main 2020 · 9 Jan · Shift 2 MCQ

If $p \rightarrow (p \wedge \sim q)$ is false, then the truth values of p and q are respectively

(A) F, F
(B) T, F
(C) T, T
(D) F, T

Answer: (C) T, T · Key from source paper

Q83 JEE Main 2020 · 8 Jan · Shift 1 MCQ

Which one of the following is a tautology?

(A) $(p \wedge (p \rightarrow q)) \rightarrow q$
(B) $q \rightarrow (p \wedge (p \rightarrow q))$
(C) $p \wedge (p \vee q)$
(D) $p \vee (p \wedge q)$

Answer: (A) $(p \wedge (p \rightarrow q)) \rightarrow q$ · Key from source paper

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Q84 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Which of the following statement is a tautology?

(A) $p \vee (\sim q) \rightarrow p \wedge q$
(B) $\sim (p \wedge \sim q) \rightarrow p \vee q$
(C) $\sim (p \vee \sim q) \rightarrow p \wedge q$
(D) $\sim (p \vee \sim q) \rightarrow p \vee q$

Answer: (D) $\sim (p \vee \sim q) \rightarrow p \vee q$ · Key from source paper

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Q85 JEE Main 2020 · 7 Jan · Shift 1 MCQ

For two statements p and q, the logical statement $(p \rightarrow q) \wedge (q \rightarrow \sim p)$ is equivalent to

(A) p
(B) q
(C) $\sim p$
(D) $\sim q$

Answer: (C) $\sim p$ · Key from source paper

Q86 JEE Main 2020 · 7 Jan · Shift 2 MCQ

Let A, B, C and D be four non-empty sets. The contrapositive statement of "If $A \subseteq B$ and $B \subseteq D$, then $A \subseteq C$" is

(A) If $A \nsubseteq C$, then $A \subseteq B$ and $B \subseteq D$
(B) If $A \subseteq C$, then $B \subset A$ and $D \subset B$
(C) If $A \nsubseteq C$, then $A \nsubseteq B$ and $B \subseteq D$
(D) If $A \nsubseteq C$, then $A \nsubseteq B$ or $B \nsubseteq D$

Answer: (D) If $A \nsubseteq C$, then $A \nsubseteq B$ or $B \nsubseteq D$ · Key from source paper

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Q87 JEE Main 2019 · 12 Apr · Shift 1 MCQ

If the truth value of the statement $p \rightarrow \sim q \vee r$ is false F, then the truth values of the statements p, q, r are respectively

(A) T, F, T
(B) T, F, F
(C) T, T, F
(D) F, T, T

Answer: (C) T, T, F · Key from source paper

Q88 JEE Main 2019 · 12 Apr · Shift 2 MCQ

The Boolean expression $\sim (p \Rightarrow (\sim q))$ is equivalent to

(A) $(\sim p) \Rightarrow q$
(B) $q \Rightarrow \sim p$
(C) $p \vee q$
(D) $p \wedge q$

Answer: (D) $p \wedge q$ · Key from source paper

Q89 JEE Main 2019 · 10 Apr · Shift 1 MCQ

Which one of the following Boolean expression is a tautology?

(A) $(p \vee q) \wedge (\sim p \vee \sim q)$
(B) $(p \wedge q) \vee (p \wedge \sim q)$
(C) $(p \vee q) \wedge (p \vee \sim q)$
(D) $(p \vee q) \vee (\sim p \vee \sim q)$

Answer: (D) $(p \vee q) \vee (\sim p \vee \sim q)$ · Key from source paper

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Q90 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The negation of the Boolean expression $\sim s \vee \sim r \wedge s$ is equivalent to

(A) r
(B) $s \wedge r$
(C) $s \vee r$
(D) $\sim s \wedge \sim r$

Answer: (B) $s \wedge r$ · Key from source paper

Q91 JEE Main 2019 · 9 Apr · Shift 1 MCQ

For any two statement p and q, the negative of the expression $p \vee (\sim p \wedge q)$ is

(A) $\sim p \vee \sim q$
(B) $p \wedge q$
(C) $\sim p \wedge \sim q$
(D) $p \leftrightarrow q$

Answer: (C) $\sim p \wedge \sim q$ · Key from source paper

Q92 JEE Main 2019 · 9 Apr · Shift 2 MCQ

If $p \Rightarrow (q \vee r)$ is $False$, then the truth values of p, q, r are respectively, (where T is $True$ and F is $False$)

(A) T, F, F
(B) F, T, T
(C) F, F, F
(D) T, T, F

Answer: (A) T, F, F · Key from source paper

Q93 JEE Main 2019 · 8 Apr · Shift 1 MCQ

The contrapositive of the statement "If you are born in India, then you are a citizen of India", is

(A) If you are not born in India, then you are not a citizen of India.
(B) If you are a citizen of India, then you are born in India.
(C) If you are born in India, then you are not a citizen of India.
(D) If you are not a citizen of India, then you are not born in India.

Answer: (D) If you are not a citizen of India, then you are not born in India. · Key from source paper

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Q94 JEE Main 2019 · 8 Apr · Shift 2 MCQ

Which one of the following statements is not a tautology?

(A) $p \vee q \rightarrow p \vee (\sim q)$
(B) $p \wedge q \rightarrow (\sim p \vee q)$
(C) $p \rightarrow p \vee q$
(D) $p \wedge q \rightarrow p$

Answer: (A) $p \vee q \rightarrow p \vee (\sim q)$ · Key from source paper

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Q95 JEE Main 2019 · 12 Jan · Shift 1 MCQ

The Boolean expression $((p \wedge q) \vee (p \vee \sim q)) \wedge (\sim p \wedge \sim q)$ is equivalent to

(A) $p \wedge (\sim q)$
(B) $(\sim p) \wedge (\sim q)$
(C) $p \vee (\sim q)$
(D) $p \wedge q$

Answer: (B) $(\sim p) \wedge (\sim q)$ · Key from source paper

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Q96 JEE Main 2019 · 12 Jan · Shift 2 MCQ

The expression $\sim (\sim p \rightarrow q)$ is logically equivalent to

(A) $p \wedge \sim q$
(B) $\sim p \wedge \sim q$
(C) $p \wedge q$
(D) $\sim p \wedge q$

Answer: (B) $\sim p \wedge \sim q$ · Key from source paper

Q97 JEE Main 2019 · 11 Jan · Shift 1 MCQ

If q is false and p $\wedge$ q $\leftrightarrow$ r is true, then which one of the following statements is a tautology?

(A) (p $\vee$ r) $\rightarrow$ (p $\wedge$ r)
(B) (p $\wedge$ r) $\rightarrow$ (p $\vee$ r)
(C) p $\wedge$ r
(D) p $\vee$ r

Answer: (B) (p $\wedge$ r) $\rightarrow$ (p $\vee$ r) · Key from source paper

Q98 JEE Main 2019 · 11 Jan · Shift 2 MCQ

Contrapositive of the statement "If two numbers are not equal, then their squares are not equal". is :

(A) If the squares of two numbers are not equal, then the numbers are equal.
(B) If the squares of two numbers are equal, then the numbers are not equal.
(C) If the squares of two numbers are equal, then the numbers are equal.
(D) If the squares of two numbers are not equal, then the numbers are not equal.

Answer: (C) If the squares of two numbers are equal, then the numbers are equal. · Key from source paper

Q99 JEE Main 2019 · 10 Jan · Shift 2 MCQ

Consider the following three statements:
P : 5 is a prime number
Q : 7 is a factor of 192
R : LCM of 5 and 7 is 35
Then the truth value of which one of the following statements is true?

(A) $P \vee (\sim Q \wedge R)$
(B) $(P \wedge Q) \vee (\sim R)$
(C) $(\sim P) \vee (Q \wedge R)$
(D) $(\sim P) \wedge (\sim Q \wedge R)$

Answer: (A) $P \vee (\sim Q \wedge R)$ · Key from source paper

Q100 JEE Main 2019 · 9 Jan · Shift 1 MCQ

If the Boolean expression $p \oplus q \wedge \sim p \odot q$ is equivalent to $p \wedge q$, where $\oplus, \odot \in \wedge, \vee$, then the ordered pair $\oplus, \odot$ is

(A) $\vee, \wedge$

(B) $\wedge, \wedge$

(C) $\vee, \vee$

(D) $\wedge, \vee$

Answer: (D) $\wedge, \vee$ · Key from source paper

Q101 JEE Main 2019 · 9 Jan · Shift 2 MCQ

The logical statement $[\sim (\sim p \vee q) \vee (p \wedge r)] \wedge (\sim q \wedge r)$ is equivalent to

(A) $(\sim p \wedge \sim q) \wedge r$

(B) $(p \wedge r) \wedge \sim q$

(C) $(p \wedge \sim q) \vee r$

(D) $\sim p \vee r$

Answer: (B) $(p \wedge r) \wedge \sim q$ · Key from source paper

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Q102 JEE Main 2018 · 16 Apr · Online MCQ

If $p \rightarrow (\sim p \vee \sim q)$ is false, then the truth values of p and q are, respectively

(A) F, F

(B) T, T

(C) F, T

(D) T, F

Answer: (B) T, T · Key from source paper

Q103 JEE Main 2018 · 15 Apr · Shift 1 MCQ

If $(\mathrm{p} \wedge \sim \mathrm{q}) \wedge (\mathrm{p} \wedge \mathrm{r}) \rightarrow \sim p \vee q$ is false, then the truth values of p, q and r are respectively

(A) F, T, F

(B) T, F, T

(C) F, F, F

(D) T, T, T

Answer: (B) T, F, T · Key from source paper

Q104 JEE Main 2018 · 8 Apr · Offline MCQ

The Boolean expression $\sim (p \vee q) \vee (\sim p \wedge q)$ is equivalent to

(A) $\sim q$
(B) $\sim p$
(C) p
(D) q

Answer: (B) $\sim p$ · Key from source paper

Q105 JEE Main 2017 · 9 Apr · Online MCQ

The contrapositive of the statement 'If two numbers are not equal, then their squares are not equal', is

(A) If the squares of two numbers are equal, then the numbers are not equal
(B) If the squares of two numbers are not equal, then the numbers are equal
(C) If the squares of two numbers are not equal, then the numbers are not equal
(D) If the squares of two numbers are equal, then the numbers are equal

Answer: (D) If the squares of two numbers are equal, then the numbers are equal · Key from source paper

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Q106 JEE Main 2017 · 8 Apr · Online MCQ

The proposition $(\sim p) \vee (p \wedge \sim q)$ is equivalent to

(A) $p \rightarrow \sim q$
(B) $p \wedge \sim q$
(C) $q \rightarrow p$
(D) none

Answer: (A) $p \rightarrow \sim q$ · Key from source paper

Q107 JEE Main 2017 · 2 Apr · Offline MCQ

The statement $(p \rightarrow q) \rightarrow ((\sim p \rightarrow q) \rightarrow q)$ is

(A) A tautology
(B) Equivalent to $\sim p \rightarrow q$
(C) Equivalent to $p \rightarrow \sim q$
(D) A fallacy

Answer: (A) A tautology · Key from source paper

Q108 JEE Main 2016 · 10 Apr · Online MCQ

The contrapositive of the following statement, "If the side of a square doubles, then its area increases four times", is

(A) if the area of a square increases four times, then its side is not doubled.
(B) if the area of a square increases four times, then its side is doubled.
(C) if the area of a square does not increase four times, then its side is not doubled.
(D) if the side of a square is not doubled, then its area does not increase four times.

Answer: (C) if the area of a square does not increase four times, then its side is not doubled. · Key from source paper

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Q109 JEE Main 2016 · 9 Apr · Online MCQ

Consider the following two statements:
P : If 7 is an odd number, then 7 is divisible by 2.
Q : If 7 is a prime number, then 7 is an odd number.
If V_1 is the truth value of the contrapositive of P and V_2 is the truth value of contrapositive of Q, then the ordered pair (V_1, V_2) equals

(A) (F, T)
(B) (F, F)
(C) (T, F)
(D) (T, T)

Answer: (A) (F, T) · Key from source paper

Q110 JEE Main 2016 · 3 Apr · Offline MCQ

The Boolean Expression $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ is equivalent to

(A) $p \vee q$
(B) $p \vee \sim q$
(C) $\sim p \wedge q$
(D) $p \wedge q$

Answer: (A) $p \vee q$ · Key from source paper

Q111 JEE Main 2015 · 11 Apr · Online MCQ

Consider the following statements:
P: Suman is brilliant
Q: Suman is rich
R: Suman is honest
The negation of the statement, "Suman is brilliant and dishonest if and only if Suman is rich" can be equivalently expressed as

(A) $\sim Q \leftrightarrow \sim P \vee R$
(B) $\sim Q \leftrightarrow P \vee \sim R$
(C) $\sim Q \leftrightarrow P \wedge \sim R$
(D) $\sim Q \leftrightarrow \sim P \wedge R$

Answer: (C) $\sim Q \leftrightarrow P \wedge \sim R$ · Key from source paper

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Q112 JEE Main 2015 · 10 Apr · Online MCQ

The contrapositive of the statement "If it is raining, then I will not come", is

(A) if I will come, then it is not raining.
(B) if I will come, then it is raining.
(C) if I will not come, then it is raining.
(D) if I will not come, then it is not raining.

Answer: (A) if I will come, then it is not raining. · Key from source paper

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Q113 JEE Main 2015 · 4 Apr · Offline MCQ

The negation of $\sim s \vee (\sim r \wedge s)$ is equivalent to

(A) $s \wedge r$
(B) $s \wedge \sim r$
(C) $s \wedge (r \wedge \sim s)$
(D) $s \vee (r \vee \sim s)$

Answer: (A) $s \wedge r$ · Key from source paper

Q114 JEE Main 2014 · 19 Apr · Online MCQ

The contrapositive of the statement "if I am not feeling well, then I will go to the doctor" is

(A) if I will go to the doctor, then I am not feeling well.
(B) if I am feeling well, then I will not go to the doctor.
(C) if I will not go to the doctor, then I am feeling well.
(D) if I will go to the doctor, then I am feeling well.

Answer: (C) if I will not go to the doctor, then I am feeling well. · Key from source paper

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Q115 JEE Main 2014 · 12 Apr · Online MCQ

Let p, q, r denote arbitrary statements. Then the logically equivalent of the statement $\mathrm{p} \Rightarrow (\mathrm{q} \vee \mathrm{r})$ is:

(A) $(p \vee q) \Rightarrow r$
(B) $(p \Rightarrow q) \vee (p \Rightarrow r)$
(C) $(p \Rightarrow \sim q) \wedge (p \Rightarrow r)$
(D) $(p \Rightarrow q) \wedge (p \Rightarrow \sim r)$

Answer: (B) $(p \Rightarrow q) \vee (p \Rightarrow r)$ · Key from source paper

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Q116 JEE Main 2014 · 11 Apr · Online MCQ

The proposition $\sim (p \vee \sim q) \vee \sim (p \vee q)$ is logically equivalent to:

(A) p
(B) q
(C) $\sim$ p
(D) $\sim$ q

Answer: (C) $\sim$ p · Key from source paper

Q117 JEE Main 2014 · 9 Apr · Online MCQ

The contrapositive of the statement "I go to school if it does not rain" is

(A) If it rains, I go to school.
(B) If it rains, I do not go to school.
(C) If I go to school, it rains.
(D) If I do not go to school, it rains.

Answer: (D) If I do not go to school, it rains. · Checked by our team

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Q118 JEE Main 2014 · 6 Apr · Offline MCQ

The statement $\sim (p \leftrightarrow \sim q)$ is

(A) A tautology
(B) A fallacy
(C) Equivalent to $p \leftrightarrow q$
(D) Equivalent to $\sim p \leftrightarrow q$

Answer: (C) Equivalent to $p \leftrightarrow q$ · Key from source paper

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Q119 JEE Main 2013 · 25 Apr · Online MCQ

Let p and q be any two logical statements and r : $p \rightarrow (\sim p \vee q)$. If r has a truth value F, then the truth values of p and q are respectively:

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(A) F, F
(B) T, T
(C) T, F
(D) F, T

Answer: (C) T, F · Key from source paper

Q120 JEE Main 2013 · 23 Apr · Online MCQ

For integers m and n, both greater than 1, consider the following three statements : P : m divides n Q : m divides n^2 R : m is prime, then

(A) $Q \wedge R \rightarrow P$
(B) $P \wedge Q \rightarrow R$
(C) $Q \rightarrow R$
(D) $Q \rightarrow P$

Answer: (A) $Q \wedge R \rightarrow P$ · Key from source paper

Q121 JEE Main 2013 · 22 Apr · Online MCQ

The statement $p \rightarrow (q \rightarrow p)$ is equivalent to :

(A) $p \rightarrow q$
(B) $p \rightarrow (p \vee q)$
(C) $p \rightarrow (p \rightarrow q)$
(D) $p \rightarrow (p \wedge q)$

Answer: (B) $p \rightarrow (p \vee q)$ · Key from source paper

Q122 JEE Main 2013 · 9 Apr · Online MCQ

Statement-1: The statement $A \rightarrow (B \rightarrow A)$ is equivalent to $A \rightarrow (A \vee B)$. Statement-2: The statement $\sim [(A \wedge B) \rightarrow (\sim A \vee B)]$ is a Tautology.

(A) Statement- 1 is false; Statement- 2 is true.
(B) Statement-1 is true; Statement-2 is true; Statement- 2 is not correct explanation for Statement-1.
(C) Statement-1 is true; Statement- 2 is false.
(D) Statement-1 is true; Statement-2 is true; Statement- 2 is the correct explanation for Statement-1.

Answer: (C) Statement-1 is true; Statement- 2 is false. · Key from source paper

Q123 JEE Main 2013 · 7 Apr · Offline MCQ

Consider :
Statement - I : $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is a fallacy.
Statement - II : $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a tautology.

(A) Statement - I is true; statement - II is false.
(B) Statement - I is false; Statement -II is true.
(C) Statement - I true; Statement -II is true; Statement -II is a correct explanation for Statement - I.
(D) Statement - I is true; Statement - II is true; Statement - II is not a correct explanation for Statement - I.

Answer: (D) Statement - I is true; Statement - II is true; Statement - II is not a correct explanation for Statement - I. · Key from source paper

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Q124 AIEEE 2012 · 26 May · Online MCQ

Let p and q denote the following statements p : The sun is shining q : I shall play tennis in the afternoon The negation of the statement "If the sun is shining then I shall play tennis in the afternoon", is

(A) $q \Rightarrow \sim p$
(B) $q \wedge \sim p$
(C) $p \wedge \sim q$
(D) $\sim q \Rightarrow \sim p$

Answer: (C) $p \wedge \sim q$ · Key from source paper

Q125 AIEEE 2012 · 19 May · Online MCQ

Let p and q be two Statements. Amongst the following, the Statement that is equivalent to $p \rightarrow q$ is

(A) $p \wedge \sim q$
(B) $\sim p \vee q$
(C) $\sim p \wedge q$
(D) $p \vee \sim q$

Answer: (B) $\sim p \vee q$ · Key from source paper

Q126 AIEEE 2012 · 12 May · Online MCQ

The logically equivalent preposition of $p \Leftrightarrow q$ is

(A) $(p \Rightarrow q \wedge) q \Rightarrow p$)
(B) $p \wedge q$
(C) $(p \wedge q \vee) q \neq p$)
(D) $(p \wedge q \Rightarrow q \vee (p$)

Answer: (A) $(p \Rightarrow q \wedge) q \Rightarrow p$) · Key from source paper

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Q127 AIEEE 2012 · 7 May · Online MCQ

The Statement that is TRUE among the following is

(A) The contrapositive of $3x+2=8 \Rightarrow x=2$ is $x \neq 2 \Rightarrow 3x+2 \neq 8$.

(B) The converse of $\tan x=0 \Rightarrow x=0$ is $x \neq 0 \Rightarrow \tan x=0$.

(C) $p \Rightarrow q$ is equivalent to $p \vee \sim q$.

(D) $p \vee q$ and $p \wedge q$ have the same truth table.

Answer: (A) The contrapositive of $3x+2=8 \Rightarrow x=2$ is $x \neq 2 \Rightarrow 3x+2 \neq 8$. · Key from source paper

Q128 AIEEE 2012 · Offline MCQ

The negation of the statement "If I become a teacher, then I will open a school" is

(A) I will become a teacher and I will not open a school

(B) Either I will not become a teacher or I will not open a school

(C) Neither I will become a teacher nor I will open a school

(D) I will not become a teacher or I will open a school

Answer: (A) I will become a teacher and I will not open a school · Key from source paper

Q129 AIEEE 2010 MCQ

Let S be a non-empty subset of R. Consider the following statement: P : There is a rational number $\mathrm{x} \in S$ such that $\mathrm{x}>0$. Which of the following statements is the negation of the statement P ?

(A) There is no rational number $x \in S$ such that $x \leq 0$

(B) Every rational number $x \in S$ satisfies $x \leq 0$

(C) $x \in S$ and $x \leq 0 \Rightarrow x$ is not rational

(D) There is a rational number $x \in S$ such that $x \leq 0$

Answer: (B) Every rational number $x \in S$ satisfies $x \leq 0$ · Key from source paper

Q130 AIEEE 2009 MCQ

Statement-1: $\sim(p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$. Statement-2 : $\sim(p \leftrightarrow \sim q)$ is a tautology.

(A) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

(C) Statement-1 is true, Statement-2 is false

(D) Statement-1 is false, Statement-2 is true

Answer: (C) Statement-1 is true, Statement-2 is false · Key from source paper

Q131 AIEEE 2008 MCQ

Let p be the statement " x is an irrational number", q be the statement " y is a transcendental number", and r be the statement " x is a rational number iff y is a transcendental number". Statement $-1: r$ is equivalent to either q or p Statement $-2: r$ is equivalent to $\sim(p \leftrightarrow \sim q)$.

(A) Statement -1 is false, Statement -2 is true

(B) Statement -1 is true, Statement -2 is true, Statement -2 is a correct explanation for Statement -1

(C) Statement -1 is true, Statement -2 is true; Statement -2 is not a correct explanation for Statement -1.

(D) Statement -1 is true, Statement -2 is false.

Answer: (D) Statement -1 is true, Statement -2 is false. · Key from source paper

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Q132 AIEEE 2008 MCQ

The statement $p \rightarrow (q \rightarrow p)$ is equivalent to

(A) $p \rightarrow (p \rightarrow q)$

(B) $p \rightarrow (p \vee q)$

(C) $p \rightarrow (p \wedge q)$

(D) $p \rightarrow (p \leftrightarrow q)$

Answer: (B) $p \rightarrow (p \vee q)$ · Key from source paper

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